CHAPTER 3

GFP in the Cross-Cultural Context

CULTURAL STABILITY OF PERSONALITY

The controversy between universality and cultural differences is almost notoriously present in psychology. In almost every important psychological domain, we are facing a lively debate between the adherents of both viewpoints, the first stressing the universality of basic human characteristics and the other emphasizing the differences across cultures in these characteristics. The personality is not an exception, although there is a widespread consensus in the belief that the basic personality features of mankind are cross-culturally stable or universal.

Personality and Culture

A relative stability across cultures has been proposed for the basic structure of the most important variable domains in psychology. According to the historical development of the scientific research in psychology, the first domain in the list should be intelligence. The universality of the basic dimensions of intelligence was taken for granted or at least highly probable (Burt, 1941; Carroll, 1993; Cattell, 1987; Horn, 1988, 1994; Jäger, 1967; Jensen, 1998; Spearman, 1904, 1927; Sternberg & Grigorenko, 2002; Vernon, 1971, 1989). The next on the list is certainly the personality domain, which will be discussed a bit later. In other domains, the cross-cultural stability of the basic dimensions is also almost consensual, including the domains of affect or emotionality (Diener, Smith, & Fujita, 1995; Larsen & Diener, 1992; Tellegen, 1985; Watson & Clark, 1993), motivation (Cattell, 1957; Cattell, Radcliffe, & Sweney, 1963; Elliot & Thrash, 2002), self-concept (Marsh, 1990; Marsh & Shavelson, 1985; Marsh, Byrne, & Shavelson, 1988), well-being (Diener, 1984; Musek, 2008, pp. 139–160; Ryff, 1989; Ryff & Keyes, 1995), and values (Musek, 1993a, 1993b; 2000; Schwartz, 1994; Schwartz & Bilsky, 1987, 1990).

Then, what about the basic dimensions of personality? As already said, personality is traditionally viewed as a psychological domain on a very high level of cultural invariance, consistency, and stability. Yet is it really so?

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In the personality domain, several theoretical models of basic dimensions of personality have been proposed. According to different theoretical models, the number of basic dimensions varies from 16 (Cattell, 1946, 1950, 1957, 1965, 1987) to 10 (Guilford, 1959), five (the Five Factor Model: Digman, 1990; Goldberg, 1981, 1990; John, 1990; McCrae & Costa, 1987, 1998), three (Eysenck, 1952, 1970, 1986, 1991), and, more recently, two (DeYoung, Peterson, & Higgins, 2001; Digman, 1997), and even one (Musek, 2007).

In past decades, the Five-Factor model (FFM) was the most popular and dominant dimensional theory of personality. It emerged from the lexical approach to personality and comprises five very broad dimensions of personality, the Big Five or B5: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness. Many authors agree that the basic personality dimensions are considerably stable across the cultures possibly due to the remarkable degree of their heredity; the list includes the dimensions from the models of Cattell (Cattell, 1950, 1957, 1965, 1987), Eysenck (Eysenck, 1947, 1952, 1970, 1991), and FFM (Costa & McCrae, 1992a, 1992b, 1992c; Hampson, 1988; Hampson, John, & Goldberg, 1986; Goldberg, 1990; John, 1990; McCrae & Costa, 1998).

There is rather wide support for the universality of the Big Five including the studies testing the FFM across more than 50 national samples of all continents (McCrae, 2002; McCrae, Terracciano et al., 2005; Schmitt et al., 2007). The universality of the Big Five is often associated with the evolutionary and/or genetic universality transcending the cultural variation (Bouchard & Loehlin, 2001; McCrae & Costa, 1997; Wiggins & Trapnell, 1997; Yamagata et al., 2006). Moreover, some research results demonstrated the existence of the Big Five in subhuman species like chimpanzees (King & Figueredo, 1997), or even dogs (Gosling, Kwan, & John, 2003).

However, Gurwen, von Rueden, Massenkoff, Kaplan, and Lero Vie (2013) questioned the validity of the FFM for small rural societies outside the so-called Western, educated, industrialized, rich, democratic (WEIRD) environments (Henrich, Heine, & Norenzayan, 2010). Using a slightly modified version of the BFI questionnaire, they failed to replicate the Big Five structure in the sample of Bolivian Amazon Tsimane people. Nevertheless, they found quite large correlations between the BFI Big Five scales indicating strong GFP in the same population. The first factor based on these correlations explains 20.8% of the variance in the data, far more than the second factor, which accounts for 5.2% of the variance. The situation is therefore a bit paradoxical; the Big Five scales are well functioning among the Tsimane people, although the correlations between BFI items do not show a definite Big Five structure. Certainly, more research on the FFM in culturally distinct small rural or even hunting/gathering societies is needed before any definitive conclusions regarding the validity of the Big Five in these environments.

From Universal Big Five to Universal GFP

Thus, according to the majority of the research results, the Big Five dimensions of personality have been confirmed in different cultural contexts and seem to be very cross-culturally stable if not universal. The GFP as an even more general dimension than the Big Five is therefore expected to be still more universal. Finally, the GFP is resulting from the correlations among the Big Five.

Thus, some statements reported in both previous chapters can be repeated here. The substantial and stable correlations between the Big Five are undeniable (Costa & McCrae, 1992c; Digman, 1997; Markon, Krueger, & Watson, 2005; Musek, 2007; Rushton, Bons, & Hur, 2008; Rushton & Irwing, 2008). In my previous research (Musek, 2007), exploratory and confirmatory factor analyses using different personality measures in three different samples confirmed the existence of a very strong first factor in personality domain, which can be interpreted as a general factor of personality (GFP) or the Big One. GFP was characterized by high versus low Emotional Stability, Conscientiousness, Agreeableness, Extraversion, and Openness, and by high versus low higher-order factors of personality, Stability, and Plasticity. Therefore, I proposed a comprehensive theoretical model of personality structure with the GFP at the highest level of the hierarchy (see Figs. 1.5, 2.4 and 2.8). GFP was interpreted as a basic personality disposition that integrates the most general noncognitive dimensions of personality. It is associated with social desirability, emotionality, motivation, well-being, satisfaction with life, and self-esteem. It also may have deep biological roots, evolutionary, genetic, and neurophysiologic.

Moreover, according to the more recent research, the existing structural models of psychology should be upgraded with the dimensional model containing the GFP at the apex of the structural hierarchy (Hirschi, 2008; Musek, 2007; Rushton et al., 2008; Rushton et al., 2009; Rushton & Irwing, 2008, 2009a, 2009b; Veselka, Schermer, Petrides, & Vernon, 2009). Consequently, a new structural paradigm in personality theory could be proposed with the GFP at the top of the structural hierarchy of personality (pyramidal paradigm of personality structure). All of Chapter 2 was dedicated to the development of this new paradigm of the personality structure.

The existence of GFP was corroborated by several other authors (Erdle & Rushton, 2010; Hirschi, 2008; Musek, 2007, 2009, 2010a, 2010b, 2010c, 2011; Rushton & Erdle, 2010; Rushton et al., 2008; Rushton et al., 2009; Rushton & Irwing, 2008, 2009a, 2009b, 2011; Veselka et al., 2009; Van der Linden, te Nijenhuis, & Bakker, 2010) and confirmed in a series of further studies (for a review, see Figueredo, Woodley of Menie, & Jake Jacobs, 2016; Just, 2011; Rushton & Irwing, 2011).

Now, the question arises whether this pyramidal structure of personality is evident also in the cross-cultural context. Can we speak of the transcultural stability of the Big One or GFP? It would represent a very strong argument for the possible biological, evolutionary, and genetic basis of the GFP. Also, cross-cultural stability could be a considerable indicator of psychological validity and psychological meaningfulness of GFP, indicating that its nature transcends culturally dependent influences.

The probable evolutionary, genetic, and neurophysiologic basis renders the universality of the GFP even more plausible. Rushton et al. (2008) tested the genetic basis of the GFP on the twin sample and found the heritability of .82. In this respect, they conclude that "the twin data show GFP has an early age of onset with 50% of the variance attributable to non-additive (dominance) genetic influence and 50% to unique, non-shared environmental influence." The evolutionary origins of the GFP have been fairly demonstrated in the psychological literature (Figueredo et al., 2016).

GFP ACROSS CULTURES

A special study was planned in order to test the stability and consistency of the GFP and other higher-order factors of personality across the data originating from different national and cultural sources. The five-factor structure has been tested and validated very widely across the world (for a thorough review see McCrae & Terracciano, 2008; McCrae, Terraciano et al., 2005; Saucier & Goldberg, 2003, pp. 1–29; Schmitt et al., 2007). Some studies embraced a very respectful number of national samples, for example, Schmitt et al. (2007) study on 56 nations. In the majority of this research, the five-factor structure has been confirmed and significant correlations between the Big Five have also been found. Thus, at least hypothetically, we can expect substantial transcultural stability of GFP on the basis of stable correlations among the Big Five that have been replicated throughout the world. In the research that has been conducted so far, the existence of a rather strong GFP has been reported for the samples from Europe (Musek, 2007), the United States, and Asia (Rushton et al., 2008). The present study will focus on available data with a special interest in the comparable results on a very large multinational or multicultural scale. The international study that clearly meets this request is the Schmitt et al. (2007) study, which has been carried out on 56 national samples using BFI (John, 1990; John, Donahue, & Kentle, 1991; John & Srivastava, 1999, pp. 102–138) as the measure of the Big Five. Additionally, some other national samples from Europe, North America, and Asia were included in the research.

Method

Source Studies, Participants, and Measures

In the present investigation we included data available from 10 different studies including 12 dataset collections being published or otherwise accessible in the period 1993 to 2009. In all cases, the analyzed personality data comprised the correlation matrix of the Big Five factors. The Big Five factors were measured by different instruments on samples representing different national and cultural environments. Data from the following sources have been analyzed in this study:

1. The personality data from the big international study of Schmitt et al. (2007), referred to as Schmitt data in the following text. The original data were collected on 56 national samples with 17,837 respondents. The entire methodology of this huge cross-cultural research is explained in detail in the Method section of the published article (Schmitt et al., 2007, pp. 179–184). The Big Five factors were measured by means of Big Five Inventory (BFI) (Benet-Martínez & John, 1998). BFI consists of 44 items that measure five personality dimensions—Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness—using self-report ratings on the scale from 1 (disagree strongly) to 5 (agree strongly) for each item. For all national samples, the respective translations of BFI items were constructed and applied.
2. The personality scales from the big data collection of the National Survey of Midlife Development in the US, II (MIDUS II; Ryff et al., 2007) (MIDUS data). The scales contain 26 items measuring Big Five factors (MIDI Personality Scales; Lachman & Weaver, 1997; Rossi, 2001). The data used in our analyses were collected on a sample of 4032 participants, 1800 males and 2232 females ages 30–84 years (mean age = 56.25, SD = 12.39). The reliability of the MIDI scales ranges from

.68 to .81 (Cronbach Alpha). Other technical details concerning the sample and measures are reported in Ryff et al. (2007).

3. The BFI scales correlation matrix from the Slovenian national sample (Musek, 2009) (Musek data). The sample includes 916 participants, 249 males and 667 females ages 13–81 (mean age = 34.12, S.D. = 10.89). The reliability coefficients (Cronbach Alpha) for the Big Five scales in the translated Slovenian version of the BFI ranged from .74 to .82.
4. The IPIP Big Five scales from the Synthetic Aperture Personality Assessment (SAPA) collection of data (Revelle & Laun, 2004; Revelle, Wilt, & Rosenthal, 2009) (SAPA data). The correlation matrix was based on the large Internet sample of respondents (N = 51,140) from different national groups. The participants ranged from 11 to 99 years with mean age 27.59 for 19,051 male and 26.38 for 32,907 female subjects. About 75% of participants were from North America and the rest from a variety of other countries throughout the world. The Big Five were measured by 120 items of IPIP (Goldberg, 1999; Goldberg et al., 2006).
5. The personality data from Eap et al. (2008) study. Two different correlation matrices for the Big Five factors were taken, first for the 320 participants of the Asian American sample (EapAS data), and second for the 242 participants of the European American sample (EapEU data). Details concerning the study are available from Eap et al. (2008).
6. The personality data from the study of Chinese (Hong Kong) sample (Yik & Bond, 1993) that included 656 participants (Yik data). The Big Five factors were measured on the basis of self-ratings, using adjective descriptors (John, Goldberg, & Angleitner, 1984; Yik & Bond, 1993). Further details concerning the study are available from Yik and Bond (1993).
7. The personality data from the study of Chinese (People's Republic of China) sample with 1419 participants (Lanyon & Goodstein, 2007) (CLUES data). The Big Five were measured by CLUES questionnaire (Goodstein & Lanyon, 2005). Further details concerning the study are available from Lanyon and Goodstein (2007).
8. The personality data from the study of a Pakistani sample (Aziz & Jackson, 2001) with 160 participants (108 males and 52 females, ages 20–29 years, mean age = 23.09 years, S.D. = 1.93) (Aziz data). The Big Five factors were measured by BFI version 4a (John et al., 1991). Further details concerning the study are available from Aziz and Jackson (2001).

9. The personality data from the study of American and South Korean samples (Mi Kyoung Jin, 2005) (Mi Kyoung Jin data). Two samples were included in the study, the US sample (125 participants) and the Korean sample (87 participants). The Big Five factors were measured by NEO-PI (Costa & McCrae, 1985) that contains 180 items being rated on a 5-point continuum ranging from "strongly disagree" to "strongly agree." Correlations between the Big Five factors have been calculated for the entire number of 212 participants. Further details concerning the study are available from Mi Kyoung Jin (2005).

10. The personality data from the study of US and European Union (EU) executives (Boudreau, Boswell, & Judge, 1999). Data were collected from two large samples with American and European executives as participants. The American sample (BoUS data) included 1885 participants (90% males, mean age 47) and European sample (BoEU data) included 1871 participants (87% males, mean age 42.4). The Big Five factors were measured with the NEO-FFI Personality Inventory, based on the NEO Personality Inventory, one of the most widely used and validated measures of the FFM (Costa & McCrae, 1992c). Each of the five factors in the NEO-FFI contains 12 statements, which are assessed on a rating scale from 1 (strongly disagree) to 5 (strongly agree). Further details concerning the study are available from Boudreau et al. (1999).

Procedure of Data Analysis

The sets of correlations between the Big Five factors have been reproduced for all 12 samples from the 10 abovementioned studies (see Table 3.1). In the case of the Schmitt et al. (2007) study, the correlation set was obtained on the basis of the aggregated data on 56 different national samples. Thus, the average values of the Big Five factors of each national sample have been correlated and put into correlation matrix in analogous manner, as if they were individual values. Consequently, the correlations in this case represent the relationships between the averages of nationalities. In all other cases, the correlation sets represent the correlations between the average values of individual participants. All sets were exploratory factor-analyzed using three different algorithms, the principal component (PC) method, principal axes (PA) method, and the maximum likelihood (ML) method. Additionally, all sets of correlations were analyzed by confirmatory factor analyses using the structural equation model (SEM) approach. We chose both exploratory and confirmatory approaches for the following reasons. First, the stability of the latent structure of the relationships between the Big Five across different

Table 3.1 Big Five correlation sets analyzed in the study

	E	A	C	N	O		E	A	C	N	O
Schmitt data						**Yik data**					
E	–	.20	.25	−.49	.27		–	.35	.20	−.49	.59
A		–	.65	−.48	.26			–	.66	−.57	.38
C			–	−.57	.20				–	−.45	.31
N				–	−.09					–	−.31
O					–						–
MIDUS data						**CLUES data**					
E	–	.50	.28	−.19	.51		–	.41	.47	−.55	.46
A		–	.29	−.11	.33			–	.49	−.48	.31
C			–	−.19	.34				–	−.45	.26
N				–	−.21					–	−.43
O					–						–
Musek data						**Aziz data**					
E	–	.30	.25	−.45	.42		–	.16	.17	−.27	.25
A		–	.23	−.50	.18			–	.46	−.40	.35
C			–	−.32	.13				–	−.40	.31
N				–	−.20					–	−.20
O					–						–
SAPA data						**Mi Kyoung Jin data**					
E	–	.47	.22	−.34	.24		–	.09	.16	.07	.51
A		–	.31	−.21	.25			–	.29	−.22	.28
C			–	−.26	.16				–	−.14	.23
N				–	−.16					–	−.11
O					–						–

EapAS data						BoUS data					
E	–	.08	.24	−.25	.30		–	.32	.29	−.42	.24
A		–	.36	−.35	.27			–	.18	−.30	.09
C			–	−.42	.32				–	−.35	.00
N				–	−.15					–	−.10
O					–						–
EapEU data						**BoEU data**					
E	–	.32	.21	−.32	.37		–	.10	.33	−.38	.23
A		–	.39	−.44	.36			–	.12	−.18	.11
C			–	−.28	.11				–	−.39	.06
N				–	−.11					–	−.18
O					–						–

cultures cannot be taken for granted and must be discovered or tested first. Therefore, the exploratory analyses should be appropriate in the first place. Second, the hypothesis of the GFP underlying the correlations of the Big Five is corroborated to such extent by the previous research (Musek, 2007; Rushton et al., 2008; Rushton & Irwing, 2008) that confirmatory analyses of this hypothesis are justified as well, especially if the confirmatory models could be derived from the results of the prior exploratory analyses. All correlation sets were analyzed using the statistical program packages SPSS 23.0 (IBM Corp. Released 2015, 2015) and R program language (R Core Team, 2015).

Results and Discussion

The results of the study presented here will be displayed in three steps. First, the appropriateness of the data for the subsequent multivariate analyses will be preliminarily discussed. In the next step, the results of the exploratory factor analyses will be demonstrated and discussed. Finally, the data will be analyzed by means of the confirmatory analysis models (SEM) and different models of the SEM analysis will be compared.

Preliminary Considerations

Table 3.1 shows the correlation sets among the Big Five factors derived from 12 samples included in our research model. The correlations range from −.57 to .66. On average, the highest correlations are between E and O (from .23 to .59, mean $r = .40$), A and C (.12 to .66, mean $r = .37$), and C and N (−.14 to −.57, mean $r = -.35$). The lowest correlations are between N and O (−.09 to −.43, mean $r = -.19$) and C and O (.00 to .34, mean $r = .20$). As expected, the correlations between N and other factors are negative (except one, namely between N and E in Mi Kyoung Jin data), while the correlations between E, A, C, and O tend to be positive. Provided the reverse coding of N, the correlations among the Big Five would manifest a typical positive manifold. Certainly, we must be especially attentive to the correlation matrix from the Schmitt et al. (2007) study, which represents an aggregated pattern of correlations based on the results of 56 national samples.

All correlation matrices are suitable for further multivariate procedures, particularly for the factor analyses. Table 3.2 displays the results that concern the appropriateness of the data for factor analysis and the criteria for the number of the factors to be extracted. Kaiser Meyer Olkin (KMO; Kaiser, 1974) coefficients of sampling adequacy range from .577 (acceptable) to

Table 3.2 Factorizability measures, extraction criteria, explained variance, Cronbach Alpha and McDonald Omega coefficients

	Factorizability		Extraction criteria[a] (for PC solution)					Explained variance[b]		Coefficients[c]
Source of data	KMO	Bartlett Test (p)	Kaiser	Scree Test	Parallel Analysis	Optimal coordinates	Acceleration factor	One-factor solution (PC, PA)	Two-factor solution (PC, PA)	(Cronbach Alpha, McDonald's, Omega)
Schmitt data	.655	.000	1	1	1	1	1	.49, .39	.70, .65	.73, .61, .40
MIDUS data	.714	.000	1	1	1	1	1	.45, .33	.66, .47	.68, .63, .50
Musek data	.691	.000	1	1	1	1	1	.44, .32	.62, .41	.68, .61, .51
SAPA data	.689	.000	1	1	1	1	1	.42, .28	.59, .44	.64, .61, .36
EapAS data	.647	.000	1	1	1	1	1	.43, .29	.69, .42	.65, .49, .34
EapEU data	.668	.000	1	1	1	1	1	.44, .31	.63, .47	.67, .54, .37
Yik data	.689	.000	2	1	2	2	1	.54, .44	.75, .69	.79, .56, .49
CLUES data	.804	.000	1	1	1	1	1	.55, .44	.66, .44	.79, .73, .65
Aziz data	.732	.000	1	1	1	1	1	.44, .32	.63, .45	.68, .54, .32
Mi Kyoung Jin data	.577	.000	2	2	2	2	2	.37, .25	.61, .40	.55, .55, .25
BoUS data	.690	.000	2	1	2	2	1	.40, .27	.60, .34	.60, .55, .41
BoEU data	.673	.000	2	1	1	1	1	.38, .24	.57, .33	.57, .48, .26

[a]For PC (Principal components) solutions.
[b]PC, PA consecutively.
[c]Cronbach Alpha, McDonald Hierarchical Omega with three primary factors, McDonald Hierarchical Omega with two primary factors (consecutively).

.804 (very good). Bartlett's measures of sphericity are also highly significant showing that the correlations strongly deviate from the identity pattern. In all cases, we could expect that a very substantial amount of the variance of the Big Five factors should be attributed to the latent dimension(s). Thus, the factorizability is indicated for all correlation matrices in the model. Furthermore, the Cronbach Alpha coefficients range from .55 to .79 implying the substantial internal consistency of the Big Five scales. This is in sharp contrast with the still frequent opinion that the Big Five factors are basically independent. Finally, the majority of the factor extraction criteria suggested one-factor solutions in most cases and two-factor solutions in others. The first factor itself explains from 37% to 55% of the variance in correlation matrices according to the PC algorithm and somewhat less percentages according to the PA algorithm. The strength of the first factor is obviously concordant with our hypothesis of the GFP (Musek, 2007). The hypothesis could be further corroborated by the values of McDonald's Omega hierarchical coefficient (McDonald, 1999). It was calculated using the omega algorithm included into the psych package of R program language (Revelle, 2009). The omega coefficients extending from .48 to .73 provided a default solution with three primary factors, and from .25 to .65 provided two-primaries solutions. These values indicate the salience of the general factor saturation of the variables in the majority of analyzed sources of data.

Exploratory Factor Analyses

In the next phase, the exploratory factor analyses were performed using three different mathematical algorithms: PC, PA, and ML. The first aim of the analyses was the reduction of the dimensional space of the investigated variables. According to this, the PC technique was applied because it provides a unique solution based on the total variance of original data and is best suited for the variable reduction task. Additionally, we also intended to discover the underlying structure of the Big Five factors. This aim could be best accomplished by the use of the proper factor analytic techniques as PA, ML, or others (in sensu stricto, PC is a componential analysis and not factor analysis). However, the results for PA and ML procedures turned out to be practically identical. Thus, only the results of PA analyses have been retained for the presentation here.

According to the criteria of the factor retention (see Table 3.2), we decided both for one-factor and two-factor solutions. Beside the formal criteria, this decision is strongly supported by the theoretical reasons too. Based on the previous research, the salience of both one-factor solutions demonstrating the GFP (Musek, 2007) and two-factor solutions demonstrating the Big Two (Digman, 1997) could be reasonably expected.

Table 3.3 shows the loadings on the extracted factors in one-factor and two-factor solutions for all correlation matrices derived from both algorithms, PC and PA. For one-factor solutions, the loadings of PC analyses are displayed in the rows with notation PC1 and the loadings of PA analyses in the rows with notation PA1. Analogously, the results of two-factor solutions are displayed in PC.1 (first factor) and PC.2 (second factor) rows for PC analyses and in PA.1 or PA.2 rows for PA analyses. As expected, the loadings of extracted components and the respective percentages of explained variance in PC analyses are higher than correspondent loadings of factors and respective amounts of explained variance in PA analyses. For all correlation matrices, the percent of explained variance in one-factor solutions ranged from 38 to 55 for PC analyses and from 24 to 44 for PA analyses. In two-factor solutions, the percent of explained variance ranged from 32 to 45 for PC analyses and from 22 to 34 for PA analyses for the first extracted factor and from 22 to 35 for PC analyses and from 9 to 32 for PA analyses for the second extracted factor.

The loadings of the components and factors in one-factor solutions resemble the loadings being reported in the previous research of GFP (Musek, 2007; Rushton et al., 2008; Rushton & Irwing, 2008; Rushton et al., 2008). Thus, the extracted factor in all our one-factor models confirmed the presence of a substantial GFP and is practically identical with the Big One reported by Musek (2007). It is especially important to note that a clear picture of the GFP emerged from the Schmitt et al. (2007) study with the results being obtained on aggregated data of 56 national samples.

The majority of the analyzed correlations also confirmed the existence of the Big Two, the Digman's Alpha and Beta factor or Stability and Plasticity (DeYoung et al., 2001). In the majority of the analyzed correlations, including the most representative cross-cultural data of Schmitt et al. (2007), our PC analyses revealed a dimension with high loadings on N, C, and A (at least two of them) and another dimension with high loadings on E and O (at least one of them). Both dimensions are obvious replications of the Big Two. Only for the SAPA data, the PA two-factor solution yielded rather different results with two factors that seem to be subdimensions of Alpha factor, namely a broad factor of Agreeableness (PA2.1 in SAPA section of the table) and a broad factor of Neuroticism (PA2.2). Indeed, a PA three-factor solution of SAPA (not specially reported here) yielded a third factor that resembles Digman's Beta.

Table 3.3 Big Five loadings on factors representing GFP and Big Two

Source	Higher orders[a]	Big Five factors					% of explained variance	N	Nationality	Measure
		E	A	C	N	O				
Schmitt data	PC1	.59	.79	.82	−.81	.41	49	56 national aggregates (N = 17837)	56 national samples	BFI
	PA1	.44	.71	.79	−.74	.28	39			
	PC2.1	.20	.84	.90	−.81	−.15	45			
	PC2.2	.66	−.03	−.08	−.04	.91	25			
	PA2.1	.11	.76	.85	−.57	.20	34			
	PA2.2	.98	.13	.16	−.41	.21	24			
MIDUS data	PC1	.80	.70	.62	−.41	.75	45	4032	Mostly United States	MIDI personality scales
	PA1	.76	.59	.46	−.28	.65	33			
	PC2.1	.83	.81	.49	.01	.69	43			
	PC2.2	.00	.17	−.33	.95	−.18	23			
	PA2.1	.98	.40	−.04	−.06	.34	25			
	PA2.2	−.02	.23	.67	−.28	.37	14			
Musek data	PC1	.75	.68	.54	−.78	.54	44	916	Slovenia	BFI
	PA1	.65	.57	.40	−.74	.40	32			
	PC2.1	.35	.77	.68	−.80	−.09	37			
	PC2.2	.64	−.03	−.11	−.08	.93	26			
	PA2.1	.14	.54	.32	−.87	−.12	24			
	PA2.2	.66	.05	.11	.01	.65	17			
SAPA data	PC1	.75	.74	.59	−.60	.52	42	51,410	Mostly United States	IPIP
	PA1	.68	.65	.43	−.45	−37	28			
	PC2.1	.47	.39	.76	−.82	−.27	34			
	PC2.2	.40	.48	−.14	.19	.96	27			
	PA2.1	.47	.94	.26	.19	.29	26			
	PA2.2	−.20	.19	−.19	.90	−.08	18			

EapAs data	PC1	.53	.65	.76	−.69	.61	43	320	United States Asian origin	BFI
	PA1	.38	.52	.70	−.58	.46	29			
	PC2.1	−.14	.86	.68	−.75	.13	36			
	PC2.2	.91	−.20	.18	.00	.68	27			
	PA2.1	−.06	.66	.67	−.55	.32	26			
	PA2.2	.88	−.16	.03	−.04	.21	17			
EapEu data	PC1	.67	.79	.59	−.66	.57	44	242	United States EU origin	BFI
	PA1	.52	.77	.45	−.54	.43	31			
	PC2.1	.18	.65	.83	−.79	−.17	36			
	PC2.2	.67	.28	−.20	.06	.94	29			
	PA2.1	.38	.70	.53	−.67	−.02	27			
	PA2.2	.23	.08	−.09	.13	.97	21			
Yik data	PC1	.70	.82	.71	−.77	.68	54	656	Chinese (Hong Kong)	Adjective descriptors
	PA1	.59	.79	.63	−.71	.57	44			
	PC2.1	−.08	.88	.96	−.60	−.02	41			
	PC2.2	.95	.03	−.18	−.28	.86	35			
	PA2.1	.12	.85	.75	−.53	.28	34			
	PA2.2	.99	.25	.12	−.43	.56	32			
CLUES data	PC1	.79	.73	.72	−.80	.65	55	1419	Chinese	CLUES
	PA1	.74	.64	.63	−.75	.54	44			
	PC2.1	.42	.82	.88	−.51	−.08	38			
	PC2.2	−.55	.00	.08	.45	−.95	28			
	PA2.1	.21	.57	.79	−.29	−.15	22			
	PA2.2	−.58	−.13	.05	.51	−.75	24			

Continued

Table 3.3 Big Five loadings on factors representing GFP and Big Two—cont'd

Source	Higher orders[a]	Big Five factors E	A	C	N	O	% of explained variance	N	Nationality	Measure
Aziz data	PC1	.48	.75	.74	−.70	.62	44	135	Pakistan	BFI
	PA1	.34	.68	.66	−.58	.48	32			
	PC2.1	−.02	.83	.82	−.64	.43	39			
	PC2.2	.95	−.06	−.06	−.17	.39	22			
	PA2.1	−.10	.76	.70	−.51	.39	30			
	PA2.2	.88	−.09	−.06	−.11	.13	16			
Mi Kyoung Jin data	PC1	.63	.61	.60	−.31	.79	37	212	United States, South Korea	NEO-PI
	PA1	.51	.38	.36	−.15	.84	25			
	PC2.1	.91	.11	.23	.31	.79	32			
	PC2.2	.20	−.71	−.55	.78	−.17	30			
	PA2.1	.95	−.09	.05	.18	.48	24			
	PA2.2	.12	−.67	−.43	.41	−.31	18			
BoUS data	PC1	.77	.61	.60	−.75	.32	40	1885	US executives	NEO-FFI
	PA1	.68	.45	.44	−.66	.21	27			
	PC2.1	.66	.58	.74	−.78	−.03	39			
	PC2.2	.32	.11	−.34	.02	.93	22			
	PA2.1	.48	.37	.55	−.64	−.04	22			
	PA2.2	.44	.17	−.09	−.09	.46	9			
BoEU data	PC1	.73	.38	.68	−.76	.43	38	1871	EU executives	NEO-FFI
	PA1	.59	.23	.53	−.68	.27	24			
	PC2.1	.67	.01	.86	−.74	−.07	35			
	PC2.2	.15	.63	−.22	−.10	.83	23			
	PA2.1	.49	.18	.68	−.65	−.06	23			
	PA2.2	.16	.09	−.16	−.04	.67	10			

[a]PC1, PA1: factors representing GFP according to PC and PA algorithms; PC2.1, PC2.2, and PA2.1, PA2.2: factors representing Big Two according to both algorithms.

INTERPRETING GFP IN THE NEW LIGHT

The Universality of the Pyramidal Structure of Personality

Confirmatory factor analyses (CFAs) using SEM algorithms were performed in order to obtain additional verification of the hypothesized higher-order structure of the Big Five in 12 analyzed correlation matrices. A valuable advantage of the SEM analysis is the possibility of the comparison of different SEM models. Table 3.4 exhibits most important fit indices for three comparable SEM models concerning 12 different Big Five matrices: one-factor model, uncorrelated two-factor model, and correlated two-factor model. As we can immediately see, the one-factor models are far better than models with two uncorrelated factors. All solutions for the latter are quite catastrophic according to the obtained fit indices. The independence of the Big Two is obviously a very unrealistic hypothesis. Among the one-factor models, some of them are acceptable without any modification (the models for Aziz and BoUS data), and all others became satisfactory after one or two modifications. All modifications were introduced on the basis of modification indices suggested by the program routine and concern the hypothetically expected correlations between error variances. The modifications are theoretically justified provided that the assumed error covariations are produced by the influences of social desirability and semantic similarity. The models with two correlated factors are also far more adequate than the models with uncorrelated factors. They are in fact even slightly more salient than the one-factor models. However, if we compare the models with two correlated factors with one-factor models, we must consider that the latter are more parsimonious and that the substantial correlation between two factors implies the plausibility of one-factor solution.

Thus, the results of CFA corroborated the hypothesized two-level structure of higher-order factors of the Big Five consisting of correlated Big Two on the second level and the Big One at the apex (Fig. 3.1). This conclusion is also in concordance with our structural model of personality (Musek, 2007), shown in Fig. 1.5. Thus, the highest-level structural hierarchy of personality is well reflected also on the cross-cultural level considering the dimensional structure of the Schmitt data (Fig. 3.2).

The pyramidal structural model of personality dimensions represents a structural solution that is clearly hierarchical. Another possible model of the dimensional structure of personality is the bifactor model, analogous to the similar model in the cognitive abilities domain (Holzinger & Swineford, 1937). The question remains, however, which model of higher-order factors

Table 3.4 Fit indices for the structural equation models

Data source	Model[a]	N of ≥.05 residuals	SRMR	GFI	AGFI	RMSEA	χ^2 (df)	*P*	NFI	TLI (NNFI)	CFI
Schmitt data	1-Factor	6	.083	.917	.752	.184	14.329 (5)	.014	.815	.724	.862
	1-Factor (1)	5	.072	.921	.704	.193	12.230 (4)	.016	.842	.696	.878
	1-Factor (12)	2	.030	.990	.950	.000	1369 (3)	.713	.982	1.080	1.000
	2-Factor uncor	6	.174	.887	.661	.231	19.717 (5)	.001	.746	.564	.782
	2-Factors cor	5	.072	.921	.704	.193	12.230 (4)	.016	.842	.696	.878
	2-Factors cor (1)	2	.030	.990	.950	.000	1369 (3)	.713	.982	1.080	1.000
MIDUS data	1-Factor	5	.039	.981	.943	.098	199.81 (5)	.000	.941	.885	.942
	1-Factor (1)	2	.024	.994	.978	.057	56.721 (4)	.000	.983	.961	.984
	2-Factor uncor	6	.206	.878	.635	.286	1653.5 (5)	.000	.513	.025	.513
	2-Factors cor	6	.038	.981	.928	.109	193.98 (4)	.000	.943	.860	.944
	2-Factors cor (1)	2	.024	.995	.974	.064	51.782 (3)	.000	.985	.952	.986
Musek data	1-Factor	7	.059	.958	.874	.143	99.669 (5)	.000	.872	.754	.977
	1-Factor (1)	0	.016	.997	.989	.028	6.785 (4)	.148	.991	.991	.996
	2-Factor uncor	6	.172	.917	.752	.223	232.15 (5)	.000	.702	.409	.705
	2-Factor cor	0	.016	.997	.989	.028	6.785 (4)	.148	.991	.991	.996

SAPA data	1-Factor	3	.037	.984	.952	.094	2278.7 (5)	.000	.928	.857	.928
	1-Factor (1)	0	.0147	.997	.988	.046	433.95 (4)	.000	.986	.966	.986
	2-Factor uncor	6	.182	.890	.670	.271	18928 (5)	.000	.405	−.190	.405
	2-Factor cor	3	.036	.984	.941	.104	2242.2 (4)	.000	.930	.824	.930
	2-Factors cor (1)	0	.019	.997	.983	.054	451.18 (3)	.000	.986	.953	.986
EapAS data	1-Factor	3	.057	.969	.907	.122	28.876 (5)	.000	.868	.772	.886
	1-Factor (1)	4	.041	.979	.921	.106	18.327 (4)	.001	.916	.829	.932
	1-Factor (2)	1	.027	.992	.961	.059	6.348 (3)	.096	.971	.947	.984
	2-Factor uncor	6	.147	.929	.787	.194	65.099 (5)	.000	.703	.426	.713
	2-Factors cor	4	.041	.979	.921	.106	18.327 (4)	.001	.916	.829	.932
	2-Factors cor (1)	1	.027	.992	.961	.059	6.348 (3)	.096	.971	.947	.984
EapEU data	1-Factor	5	.062	.960	.881	.137	27.489 (5)	.000	.857	.752	.876
	1-Factor (1)	4	.040	.977	.913	.104	14.329 (4)	.006	.925	.858	.943
	1-Factor (2)	2	.030	.989	.947	.070	60.576 (3)	.087	.966	.934	.980
	2-Factor uncor	6	.163	.915	.746	.214	6.293 (5)	.000	.685	.391	.695
	2-Factor cor	4	.040	.977	.913	.104	14.329 (4)	.006	.925	.858	.943
	2-Factors cor (1)	2	.030	.989	.947	.070	6.576 (3)	.087	.966	.934	.980

Continued

Table 3.4 Fit indices for the structural equation models—cont'd

Data source	Model[a]	N of ≥.05 residuals	SRMR	GFI	AGFI	RMSEA	χ^2 (df)	*P*	NFI	TLI (NNFI)	CFI
Yik data	1-Factor	5	.109	.864	.592	.291	281.95 (5)	.000	.759	.522	.761
	1-Factor (modif)	2	.063	.940	.774	.200	108.77 (4)	.000	.907	.774	.910
	1-Factor (modif2)	1	.023	.991	.953	.080	15.654 (3)	.001	.987	.963	.989
	2-Factor uncor	6	.222	.882	.646	.272	247.79 (5)	.000	.788	.581	.791
	2-Factors cor	2	.063	.940	.774	.200	108.77 (4)	.000	.907	.774	.910
	2-Factors cor (1)	1	.023	.991	.953	.080	15.654 (3)	.001	.987	.963	.989
CLUES data	1-Factor	4	.040	.974	.921	.113	95.209 (5)	.000	.952	.908	.954
	1-Factor (1)	1	.026	.988	.955	.084	43.971 (4)	.001	.978	.949	.980
	2-Factor uncor	6	.263	.857	.570	.325	752.07 (5)	.000	.618	.236	.618
	2-Factor cor	4	.033	.981	.928	.107	68.524 (4)	.000	.965	.918	.967
	2-Factors cor (1)	1	.020	.992	.959	.078	29.181 (3)	.002	.985	.955	.987
Aziz data	1-Factor	4	.044	.980	.941	.060	7.3837 (5)	.194	.928	.949	.974
	2-Factor uncor	6	.160	.925	.774	.191	29.419 (5)	.000	.715	.475	.738
	2-Factors cor	2	.035	.985	.944	.047	5.1795 (4)	.269	.950	.968	.987

Mi Kyoung Jin data	1-Factor	5	.087	.947	.840	.148	28.043 (5)	.000	.772	.594	.797
	1-Factor (1)	4	.069	.972	.894	.118	15.724 (4)	.003	.873	.742	.897
	1-Factor (2)	3	.048	.984	.923	.097	9.0052 (3)	.029	.927	.823	.947
	2-Factor uncor	6	.110	.949	.848	.152	29.419 (5)	.000	.762	.569	.785
	2-Factor cor	2	.041	.989	.958	.049	6.0334 (4)	.197	.951	.955	.982
BoUS data	1-Factor	3	.041	.983	.950	.088	77.647 (5)	.000	.927	.863	.931
	1-Factor (1)	1	.024	.995	.981	.051	23.509 (4)	.000	.978	.954	.982
	2-Factor uncor	5	.159	.912	.738	.234	519.79 (5)	.000	.514	.028	.514
	2-Factors	1	.024	.995	.981	.051	23.509 (4)	.000	.978	.954	.982
	cor	0	.016	.998	.989	.036	1.306 (3)	.016	.988	.972	.991
BoEU data	1-Factor	3	.034	.989	.967	.072	53.85 (5)	.000	.940	.889	.945
	1-Factor (1)	0	.020	.996	.985	.045	19.218 (4)	.001	.979	.957	.983
	2-Factor uncor	6	.144	.925	.776	.210	416.06 (5)	.000	.534	.069	.535
	2-Factors cor	2	.026	.994	.976	.058	29.452 (4)	.000	.967	.928	.971

[a]Included are one-factor models (1-factor), two uncorrelated factors models (2-factor uncor), two correlated factors models (2-factor cor); the eventual modifications are specified in parenthesis: (1)—one modification, (2)—two modifications.

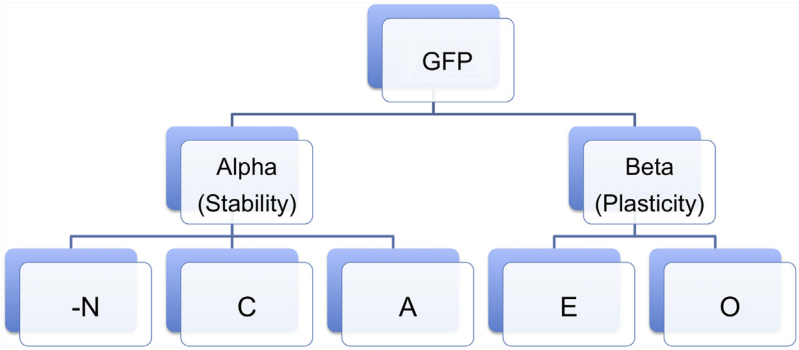

Figure 3.1 The levels of the structural hierarchy of personality confirmed in the analyses of 12 correlation matrices. The structural hierarchy comprises three levels of generality: the level of the Big Five, the level of the Big Two, and the level of the GFP.

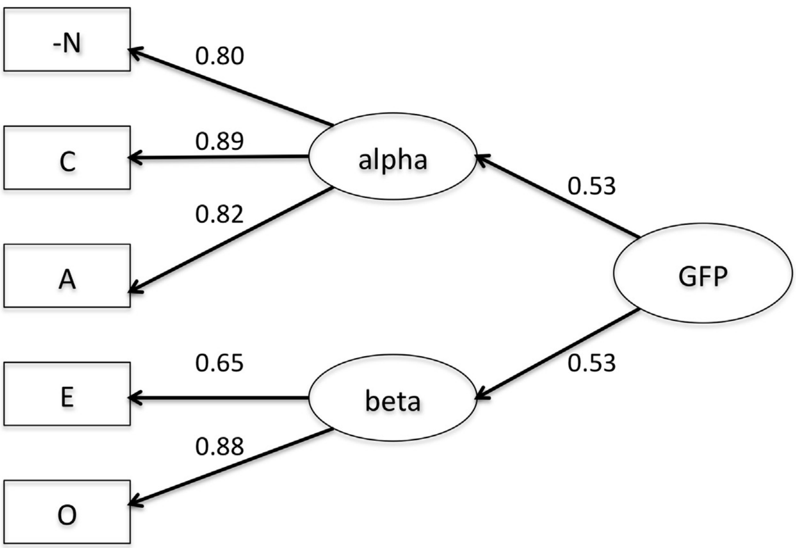

Figure 3.2 Pyramidal structure of the Big Five and higher-order factors of personality: Alpha, Beta, and GFP. The saturations were derived from Schmid–Leiman hierarchical transformation of Schmitt data using the PC algorithm.

structure is more salient in the case of the Big Five, the hierarchical model or bifactor model? Due to the small number of the starting variables (five), the identification problems complicate the comparison of both models in the use of the SEM analysis and in the use of the Schmid–Leiman transformation (Schmid & Leiman, 1957). It is reasonable to expect that fit indices of the hierarchical solution would be practically identical with the obtained indices for correlated two-factor solutions (see Table 3.4) and therefore quite acceptable. Yet, provided only modest correlations between the Big Two, the bifactor model of the higher-order personality factors is also worthy of serious consideration. The decision about this issue is beyond the scope of this discussion and will be elaborated further in Chapter 11.

Transcultural Stability of Higher-Order Personality Dimensions

According to the results of the study, the higher-order factors of personality, particularly the Big One or GFP, also the Big Two appears consistently across different cultures. The stability of the personality higher orders across different cultures and nationalities is not a surprise, however. It is in good concordance with the transcultural consistency of basic dimensions of personality, especially the Big Five, often established in the research of personality dimensions (McCrae & Terraciano, 2008; McCrae, Terraciano et al., 2005; Saucier & Goldberg, 2003, pp. 1–29; Schmitt et al., 2007). The transcultural stability of personality higher orders is therefore a logical consequence of the cross-cultural consistency of the underlying Big Five. Furthermore, the common denominators of the Big Five should exhibit a cross-cultural stability even stronger than less general personality dimensions. The culturally shared components are very probably the essential contributors to the intercorrelations among the Big Five, and consequently the role of the superordinate personality dimensions should be even more pronounced in the cross-cultural context. The hypothesized evolutionary and genetic basis is another factor that strongly promotes the cultural stability or even universality of the GFP and the Big Two.

The Strength of Higher-Order Personality Dimensions

It is a simple fact that the strength of the higher-order dimensions depends on the magnitude and number of correlations between the variables in the model. Sometimes the correlations between the Big Five are significant but small and yield higher-order factors, which are not very representative (Revelle, 2009). In the majority of correlation matrices being analyzed in this study, the correlations between the Big Five are substantial to the extent that is comparable with the correlations between variables in the ability domain, where the existence of the general factor and the group factors is widely accepted. Furthermore, it seems probable that even this substantial level of the factor strength is based on the underestimated correlations between personality traits. We must consider that the entire theory of the

Big Five rests on the assumption of the independence of basic dimensions of personality. Thus, in the construction of the psychological instruments measuring the Big Five, numerous items that have loadings on different dimensions have been eliminated. According to this procedure, the correlations between the Big Five were artificially reduced. Consequently, in fact we are dealing with the reduced correlations of the Big Five and we could logically expect even higher correlations and stronger higher-order factors if the unfiltered data would be included in the analyses.

The Nature of Higher-Order Personality Dimensions

The established cross-cultural stability of the higher-order factors of personality could be important in the current debate about their psychological nature. The main question is whether the undoubted correlations between the Big Five resulted from underlying dimensions with substantial psychological content or they are due to possible stylistic or even artifactual factors. While several authors advocate the position that tends more to the substantial content of GFP (Just, 2011; Musek, 2007; Rushton et al., 2008, 2009; Rushton & Irwing, 2008, 2009a, 2009b, 2011; Van der Linden et al., 2010; Veselka et al., 2009), some authors claim that higher orders of the Big Five can be interpreted as the result of responsive style (Backstrom, Bjorklund, & Larsson, 2009), or that they "do not necessarily imply the existence of higher order factors and might instead be due to variables that represent same-signed blends of orthogonal factors" (Ashton et al., 2009).

The Theoretical Importance of the Transcultural Stability

The transcultural consistency of the Big One and the Big Two clearly eliminates all cultural-context-dependent explanations. It also reinforces the saliency of the evolutionary, genetic, and neurophysiological interpretations (Figueredo & Rushton, 2009; Figueredo et al., 2016; Musek, 2007; Rushton et al., 2008; Veselka et al., 2009). The Big One is obviously a heritable and culturally universal superdimension of personality. Although the items measuring the Big Five undoubtedly correlate with the social desirability and evaluative factor of affective meaning (Osgood, Suci, & Tannenbaum, 1957), the common variance of the Big Five factors, which cannot be reduced to these factors, remains very substantial (Musek, 2009). Moreover, the question arises whether the social desirability reflects a mere responsive style or is an organic and substantial part of evolutionary-shaped psychological and behavioral content. Very probably, the social desirability contains more substance than style (McCrae & Costa, 1983). Provided the evolutionary origin of the Big Five and their superordinate dimensions, socially desirable traits even should be expected as a prominent behavioral component of the Big One (Figueredo et al., 2016; Musek, 2007; Rushton et al., 2008, 2009; Rushton & Irwing, 2008, 2009a, 2009b, 2011). In the Big Two, where the substantial psychological meaning also prevails (DeYoung et al., 2001), the Stability or Alpha factor is also significantly associated with social desirability.

The Psychological Content of the GFP

Thus, the higher-order factors of personality should have deeper psychological content beyond the mere stylistic, semantic, or even artifactual components. In the previous research, very robust correlations between the GFP and measures of emotionality, motivation, well-being, and self-esteem have been found (Lachman et al., 2008; Musek, 2007, 2008, 2009; Rocke & Lachman, 2008). Indeed, the correlations between GFP and general factor of well-being range up to .80 (Musek, 2008, pp. 139–160). Very probably, the Big One is a measure of personality adaptation and could be therefore interpreted as the general dimension of the personal adjustment (Lachman et al., 2008; Musek, 2007, 2009; Rocke & Lachman, 2008). Together with the general factors of motivation, emotionality, and well-being it composes a very general psychological dimension covering the noncognitive part of personality and represents the conative counterpart of the general factor of intelligence (Musek, 2008, pp. 139–160).

On the other hand, many questions and problems should be clarified more thoroughly in the further research of higher-order factors of personality. The first and most important is a simple question, what are the most important levels of personality description? Although the one-factor and two-factor solutions of the personality structure are most parsimonious and stable (Saucier, 2009), the solutions with more factors (five to seven, for example) have other advantages. The factors that influence the magnitude of correlations between the Big Two and between the Big Five must be further clarified. Sometimes, these correlations are rather high suggesting a considerable salience of the GFP (Ashton et al., 2009), and sometimes they are lower portraying a pretty weak GFP (Revelle, 2009). Also, the connections of the higher-orders of personality with the general dimensions elsewhere in the noncognitive and cognitive domains should be exhaustively investigated. More research is also needed in the line of accumulating evidence of the biological bases of personality dimensions (DeYoung & Gray, 2009), including the genetic, neuroscientific, and evolutionary factors of personality higher orders (Figueredo et al., 2016; Figueredo & Rushton, 2009; Rushton et al., 2008; Veselka et al., 2009).

Concluding Remarks

The results of the study demonstrated a rather stable higher-order dimensional structure of personality throughout the cross-cultural data. In the majority of the analyzed correlation matrices, including the aggregated data for 56 nations and a number of additional samples from different cultural origin, the extracted first factor showed a consistent pattern of saturations with the Big Two and the Big Five personality dimensions on two subsequent levels of generality. Thus, the results confirmed the hypothesized pyramidal structure of the personality dimensions where the uppermost levels were occupied by the general factor of personality (GFP or the Big One) and the Big Two (Alpha and Beta or Stability and Plasticity) (Fig. 3.2). The transcultural stability of higher-order personality dimensions represents an important aspect in theoretical interpretation of the personality structure, especially as concerns the psychological meaning and nature of GFP and Big Two. It focuses the attention on the universal features and correlations of the personality higher orders and reinforces the hypothesis of their biological basis (evolutionary, genetic, and neurophysiologic).

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